Ballistic Missile Proliferation: The Politics and Technics. Aaron Karp. Oxford University Press, Walton Street, Oxford OX2 6DP, UK. 1996. 228pp.

Since about the mid-seventies, numerous articles and books have been appearing on India's long journey (and those of the few other nations with similar geo-strategic placings) on three critical technologies: nuclear, space and defence, including missiles. This book is one such.

Karp's 'acknowledgements' begin: 'The origin of this book owes much to the support and encouragement of three men: Maurice Eisenstein, who as an official of the US Arms Control and Disarmament Agency in the late 1970s introduced me (and much of the US Government) to the issues of missile proliferation; Walther Stützle, SIPRI Director in 1986–91, who brought me back to the issue and urged me to write this book; and Adam Daniel Rotfeld, SIPRI Director since 1991, who made its completion possible.'

The Stockholm International Peace Research Institute (SIPRI), under whose aegis this book appears, has had a reputation for authoritative study and comment on matters military and on matters concerned with the international politics of peace and disarmament. This book reconfirms what many of us have assessed in the recent past: This reputation is undeserved and increasingly unwarranted. Let us explain why.

The merits of any book dealing with issues of military policy, armaments, peace and disarmament can be calibrated by comparing the facts 'relating to India' as we in this country know them – as 'insiders' or as knowledgeable members of the informed public – with what is stated in the book. If the match is poor in the Indian case it can be very reliably concluded that the match is also poor in the other cases discussed in the book, about which we in India do not have direct information. 'Very reliably' because the 'open literature' on the Indian programmes published by official and quasi-official sources in India in the English language is so extensive that no author has an excuse for relying, as Karp has done, on some unreliable newspaper articles and other dubious secondary sources. Says Karp: '. . . all large rocket projects require some insulation from outside interference. The most successful rocket projects have enjoyed continuous leadership from one agency and often one individual manager.' Quite so. Does Karp mention Dhawan? No. But goes on to this gem: '. . . one only has to recall Korolev's role in the Soviet Union and Trien's in China. In India, the only emerging power for which comparable information is available, a similar role has been played by Abdul Kalam but without comparable institutional support. Another reason for the weakness of India's rocketry programme was the excessive concentration of power in the hands of V. S. Arunachalam, the long-time Defence Ministry Science Adviser, at the expense of development specialists such as Abdul Kalam. Switched from project to project, Indian rocket specialists were unable fully to develop any of their major projects of the 1970s and 1980s. In July 1992 Arunachalam resigned and was replaced by Abdul Kalam, a change that promises greater insulation and probably greater accomplishments for Indian military rocketry.'

Or again: 'India's Prithvi. . . is the first entirely original ballistic missile developed by a regional power other than Israel. The missile testifies to both India's technical potential and its liabilities. It relies on foreign technologies – especially for its propulsion and guidance systems. . . Because ideal technology is not available, several key systems were improvized. Instead of a preferred INS, its guidance system relies on strap-down equipment, possibly backed by radio correction (*sic*!). Unable to control direction by steering the engine nozzles, it uses large and inefficient aerodynamic surfaces. The great size of the system. . . indicates more fundamental inefficiencies. In essence, India has re-invented the Scud.' And: 'A review of missile test flights in regional powers in the 1980s and early 1990s shows continuous problems with stage separation, problems revealed only through flight-testing. Indian rocketry has been plagued by such problems. An SLV-3 launcher lifted the country's first satellite into orbit in 1980, but all other SLV-3 flights failed because of stage separation problems. Its replacement, the ASLV, was first launched in 1988 but crashed prematurely into the Bay of Bengal when its second stage failed to ignite. The first two test flights of the Agni also fell short, the first when its second stage failed to ignite. Several modifications simplified stage separation in the next ASLVs and Agnis, but in the next Agni flight the second stage failed again, this time igniting prematurely. None of India's multi-stage rockets is immune. The first launch of the ambitious PSLV rocket on 20 September 1993 ended in failure when the third stage failed to fire properly.' The facts of what actually happened to the first PSLV test flight, which are on record in the public domain, do not seem to be of any relevance to this author. Indian programmes have been assessed, judged (and even dismissed – but never mind that) by this 'expert' in a book that has been admiringly reviewed by Indians in India who should know better. He, and other authors like him, rely on the reputations of their corporate affiliations to immunize them if the facts, on which the judgements are based, are garbled or wrong.

On an earlier occasion, a 'missile proliferation expert' writing on our missile programme for the SIPRI year book requested one of us (SC) for extended comments on his draft manuscript. These were freely given. They were simply ignored. This will increasingly happen. We have to realize that the purpose of foreign authors seeking 'authoritative comment' from Indian insiders is to get the 'real dope' but only for the internal purposes of the institutions or the government (mainly Western) backing these authors. There is not, and will never be, any intention of actually using, much less acknowledging, any reliable information.

The point that we wish to advance to readers of *Current Science* is this: This is not the first time that misinformation and techno-political googlies in respect of our critical scientific and technological programmes have appeared in print. Nor will they be the last. Each time Indian S&T programmes begin to approach the current technological frontier, these kinds of articles, books and 'prestigious lectures' (some by NRIs) will proliferate, both in print and in the

electronic media. It is both pointless and counter-productive to attempt case-by-case or reactive rebuttal; for, that burdens *our* time and effort, which this breed of lazy foreign author finds easy to rely on. If we do *not* rebut, their circulated conclusion is: 'Since there was no reaction, what I have said may be deemed to be the truth/facts.'

What then should be our policy? We are convinced that the only productive policy is even greater *openness* and wide dissemination at our cost of money and time, both within the country and abroad, of all except the most sensitive *technical* information. Reliable counter-proliferation with authentic public information widely pre-disseminated is the only workable antidote to the left-arm techno-googly bowled round our wicket by bowlers home-trained on the world's most treacherous academic and quasi-academic pitches.

And don't bother with this book.

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Interface Between Chemistry and Biochemistry. P. Jollès and H. Jörnvall, eds. Birkhauser Varlag AG, Klasterberg 23, P.O. Box 133, CH–4010, Basel, Switzerland. 1995. 298 pp. Price: US $ 124.

Molecular knowledge of biological process today is heavily dependent on interface between different fields. Pierre Jollès and Hans Jörnvall have attempted to highlight the importance of the interface between chemistry and biology in addressing a variety of chemical and biological problems in the book *Interface between Chemistry and Biochemistry.*

The book has articles which cover the biochemistry and chemistry of a wide spectrum of biologically active molecules. The topics are broadly classified into five sections. They are (1) chemistry at interfaces and transport, (2) chemistry and biochemistry with emphasis on enzyme activity, (3) analysis of proteins and nucleic acids, (4) synthesis of (bio) active compounds and (5) metalloproteins. Section 1 has articles on the chemistry and biochemistry of triglyceride lipases, structures of hydrophobic surfactant-associated proteins, enzyme function in organic solvents and signal peptides which sort proteins to the endoplasmic reticulum pathway. The article on lipase structures is restricted to the structurally-related mammalian enzymes and the interface aspect does not clearly come out. The article on surfactant-associated proteins is largely confined to their structure determination. The discussion on protein sorting signals appears out of place. The only article in this section that does some justice to the title of the book is the one on enzyme function in organic solvents. The advantages associated with the use of enzymes in organic solvents, the forms of enzymes used in predominantly organic medium and some important applications are clearly presented and should be very useful to those looking for such details in this area. The article would have been much more readable with a few illustrations, especially in the section where mechanisms are discussed. The articles in section 2 do justice to what the editors set out to achieve by bringing out the book. The basic principles underlying the mechanism of action of catalytic antibodies, catalytic RNA and non-biological counterparts of enzyme catalysed reaction are clearly outlined in two articles. The third article in this section is devoted to structural characterization of antigenic peptides on the cell surface of major histocompatibility complex (MHC). The emphasis has been on analysis of subpicomolar quantities of MHC-bound peptides. In section 3, there is fairly extensive coverage of chemical techniques employed for structural analysis of proteins, peptides and photodamage of nucleic acids by UV. The articles in sections 4 and 5 provide useful insights into synthesis of glycopeptides, utility of peptides in probing neuropeptide receptor of protein–protein and protein–nucleic acid interactions and Zn biochemistry.

With a few exceptions, most of the articles convey what the editors had intended to. The book will be particularly useful to chemists who would like to venture into research problems in the area of enzymes, nucleic acids or sugars.

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Fish Nutrition in Aquaculture. Series 1. Sena S. De Silva and Trevor A. Anderson. Chapman & Hall, 2–6 Boundary Row, London SE1 8HN, UK. 1995. 319 pp. Price: US$ 37.50. (Hardbound).

The Aquaculture Series by Chapman & Hall aims to present timely volumes reviewing important aspects of aquaculture. Title 1 concerning *Fish Nutrition in Aquaculture* is a most welcome book. Firstly, the global aquaculture industry is worth about 30 billion US dollars and is growing at the rate of about 10%. Clearly aquaculture has emerged as an important industry during the last decade and is practised in more than 150 countries in the world. Aquaculture, once considered an environmentally sound practice, is now regarded to be a potential polluter. Environmental restrictions are being increasingly imposed on aquacultural activities all over the world. Therefore it has become a necessity, especially for those in developing Asian countries to know more about it.

Secondly, feed and feeding are crucial elements in any animal husbandry; regarded as the highest recurrent cost in aquaculture operation, the feed cost ranges from 30 to 60%, depending on the species, culture system and intensity of operation. Fish are known to draw metabolic energy mostly from protein and lipid, rather than carbohydrate and lipid; not surprisingly the optimum protein : energy ratio is around 1 : 2 for fish but it is 1 : 10 for ruminants. Therefore the optimal dietary protein requirement for fish is 0.5 to 3 times